CLAIMS

1. Method for identifying and/or validating candidate substances for the treatment of Friedreich Ataxia, comprising the steps of

   f) providing cells with reduced frataxin expression,

   g) incubating the cells of step a) in selenium-restricted medium,

   h) reducing the cellular glutathione content of the cells of step b),

   i) contacting the cells of step c) with a candidate substance, and

   j) evaluating the response of the cells of step d),

   wherein steps b), c) and d) may be also be performed in any other order than b), c) and d), the order b), c) and d) being preferred.

2. Method according to claim 1, characterized in that the cells of step a) are cells isolated or derived from Friedreich Ataxia (FRDA)-patients, preferably fibroblast cells derived from Friedreich Ataxia (FRDA)-patients.

3. Method according to claim 1 or 2, characterized in that in step c) the cellular glutathione content is reduced by inhibiting the *de novo* synthesis of glutathione.

4. Method according to claim 3, characterized in that the cellular glutathione content is reduced by the addition of an inhibitor of the γ-glutamyl cysteine synthetase, preferably BSO (L-buthionine-(S,R)-sulfoximine).

5. Method according to any one of claims 1 to 4, characterized in that said response in step e) is increased plasma membrane permeability and/or cell death.

6. Method according to any one of claims 1 to 5, characterized in that said response in step e) is compared to the response of control cells with normal frataxin expression and/or normal cellular glutathione content and/or under selenium-supplemented incubation conditions to said candidate substance.

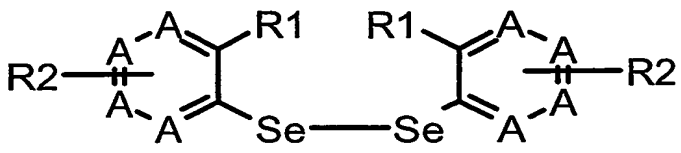
7. Method according to any one of claims 1 to 6, characterized in that said response in step e) is compared to the response of control cells with reduced frataxin expression and reduced cellular glutathione content grown in selenium-restricted medium to a known effective candidate substance, preferably compared to the response of FRDA-fibroblasts, which are reduced in cellular glutathione content, to Idebenone (6-(10-hydroxydecyl)-2,3-dimethoxy-5-methyl-1,4-benzoquinone), or Ebselen (2-phenyl-1,2-benziso-selenazol-3-(2H)-one).

8. Use of a compound selected from the group of selenium, Ebselen (2-phenyl-1,2-benzisoselenazol-3-(2H)-one), and GPX mimetics, preferably Ebselen, for the preparation of a medicament for the treatment of Friedreichs Ataxia.

9. Use of Idebenone (6-(10-hydroxydecyl)-2,3-dimethoxy-5-methyl-1,4-benzoquinone, selenium and/or GPX-mimetics in combination for the preparation of a medicament for the treatment of Friedreichs Ataxia.

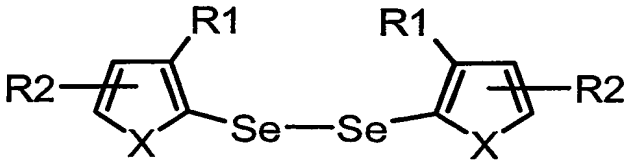
10. Use according to claim 8 or 9, wherein small molecule GPX-mimetics, preferably mono- or diseleno small molecule mimetics are used.

11. Use according to claim 10, wherein a diseleno compound of the general formula I,



(I)

or formula II



(II)

is used, wherein

A denotes, in each case independently for each aromatic substituent, (a) C for all positions or (b) one N and C for all other positions of the aromatic substituent,

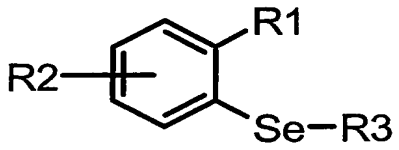
X denotes, in each case independently for each aromatic substituent, S, O, NH, NR_4, wherein R_4 denotes a linear or branched, saturated or unsaturated C_{1-10} alkyl.

R_1 denotes, in each case independently for each aromatic substituent, a hydrogen, primary or secondary, linear or branched, saturated or unsaturated C_{1-6} alkohol, a primary or secondary, linear or branched, saturated or unsaturated C_{1-6} ether, a primary, secondary or tertiary, linear or branched or cyclic, saturated or unsaturated, C_{1-8} amine, an alkyl substituted C_{1-6} urea, or an alkyl and/or aryl substituted imidazoline,

R_2 denotes, in each case independently for each aromatic substituent, a hydrogen, a primary or secondary, linear or branched, saturated or unsaturated C_{1-6} alkyl, a primary or secondary, linear or branched, saturated or unsaturated C_{1-6} ether, or a nitro, trifluoromethyl, sulfo or halo,

and its diastereomers or enantiomers and pharmaceutically acceptable salts thereof.

12. Use according to claim 9, wherein the monoseleno compound has the general formula III,



(III)

wherein

R_1 denotes a primary or secondary, linear or branched, saturated or unsaturated C_{1-6} alkohol, a primary or secondary, linear or branched, saturated or unsaturated C_{1-6} ether, a primary, secondary or tertiary, linear or branched or cyclic, saturated or unsaturated, C_{1-8} amine, an

alkyl substituted C_{1-6} urea, or an alkyl and/or aryl substituted imidazoline.

R_2 denotes a hydrogen, a primary or secondary, linear or branched, saturated or unsaturated C_{1-6} alkyl, a primary or secondary, linear or branched, saturated or unsaturated C_{1-6} ether or cyclic ether, or a nitro, sulfo, trifluoromethyl or halo,

R_3 denotes a primary or secondary, linear or branched, saturated or unsaturated, substituted or unsubstituted C_{1-6} alcohol, non-cyclic or cyclic ether,

and its diastereomers or enantiomers and pharmaceutically acceptable salts thereof.

13. Use of a seleno compound according to any one of claims 11 or 12, wherein R_1 denotes a secondary C_{1-6} alkohol, a secondary C_{1-6} ether, a secondary or tertiary, linear or cyclic C_{1-8} amine, a 1,1-di-C_{1-6} alkyl-3-C_{1-6} alk-1-yl-urea, or a 1,3-di-C_{1-6} alkyl-5-aryl imidazoline, preferably a secondary C_{1-4} alcohol, a secondary C_{1-4} ether, a secondary or tertiary, linear or cyclic C_{1-6} amine, or a 1,3-di- C_{1-3} alkyl-5-aryl imidazoline, more preferably propan-2-ol, 1-hydroxypropyl, 1-ethoxyethyl, 1,3-Dimethyl-5-phenyl-imidazolidin-4-yl, 1-hydroxy-2,2-dimethyl-propyl, 1-hyroxy-butyl, 1-(dimethylamino)-ethyl, or 1-pyrrolidine-1-yl-eth-1-yl.

14. Use of a seleno compound according to any one of claims 11 to 13, wherein R_2 denotes hydrogen, a primary or secondary, linear or branched, saturated or unsaturated C_{1-4} alkyl, a primary or secondary, linear or branched, saturated or unsaturated C_{1-4} ether, or a nitro, trifluoromethyl or halo, preferably a hydrogen, a primary or secondary, linear or branched, saturated C_{1-4} alkyl, a primary, linear, saturated C_{1-4} ether, or a nitro, trifluoromethyl or

halo, more preferably a tert-butyl, a methyl, a nitro, or a methoxy, a chloro, a bromo, a fluoro, or a trifluoromethyl.

15. Use of a seleno compound according to claim 12 to 14, wherein R_3 denotes a primary or secondary, linear or branched, saturated, substituted or unsubstituted C_{1-3} alcohol, or non-cyclic C_{1-3} ether, preferably a phenyl-substituted primary or secondary saturated C_{1-3} alcohol or C_{1-3} ether, and more preferably a 2-hydroxy-1-phenyl-ethyl, a 2-methoxy-2-phenyl-ethyl.

16. Use of a seleno compound according to claims 12 to 15, wherein R_4 denotes a linear or branched, saturated or unsaturated C_{1-4} alkyl, preferably a linear or branched, saturated C_{1-4} alkyl, and more preferably a methyl, ethyl, or isopropyl.

17. Use of a seleno compound according to claims 11, 13 or 14, wherein the aromatic substituent comprising A is a phenyl or a 2-pyridil substituent.

18. Use of a seleno compound according to claims 11, 13 or 14, wherein X denotes NH or O, preferably NH.

19. Use of a Bis[2-[1-(C_{1-6} alkylamino)-C_{1-6} alkyl]ferrocenyl]-diselenide compound for the preparation of a medicament for the treatment of Friedreichs Ataxia.

20. Use of a GPX mimetics according to any one of claims 8 to 19, wherein the mimetic is selected from Bis[2-(propan-2-ol)-phenyl]-diselenide, (S,S)-Bis[2-(1-hydroxypropyl)-5-tert-butyl-phenyl]-diselenide, (S,S)-Bis[3-(1-ethoxyethyl)-pyridine-2]diselenide, 1-[2-(2-Hydroxy-(S)-1-phenyl ethyl selenyl)-phenyl]-propan-(R)-1-ol, 1-[2-(2-Hydroxy-(S)-1-phenyl ethyl selenyl)-phenyl]-propan-(S)-1-ol, (S,S)-Bis[2-(1-hydroxypropyl)-6-methyl-phenyl]-diselenide, (S,S)-Bis[2-(1-hydroxypropyl)-4-nitro-phenyl]-diselenide, (S)-1-[3-Methoxy 2-(2-phenyl-tetrahydrofuran-3-yl-selenyl)-phenyl]-ethanol, Bis[2-(1,3-Dimethyl-(S)-5-phenyl-imidazolidin-(S)-4-yl)-phenyl]-diselenide, (Bis[2-(1-hydroxy-2,2-

dimethyl-propyl-phenyl]-diselenide, Bis[4-methoxy-phenyl]-diselenide, (Bis[2-(1-hydroxy-butyl-phenyl]-diselenide, [R,S;R,S]-Bis[2-[1-(dimethylamino)-ethyl]ferrocenyl]-diselenide, (R,R)-Bis[2-(1,1-dimethyl-3-eth-1-yl-urea)-phenyl]-diselenide, (R,R)-Bis[2-(1-dimethylamino-eth-1-yl)-phenyl]-diselenide, (R,R)-Bis[2-(1-pyrrolidine-1-yl-eth-1-yl)-phenyl]-diselenide.

21. Use according to any one of claims 8 to 20, wherein the seleno compound is combined with free radical scavengers and/or antioxidants, preferably coenzyme Q10 or derivatives thereof, N-acetyl cysteine, and/or vitamin E or derivatives thereof.

22. Use according to any one of claims 8 to 21 in combination with buspirone, amantadine salts, Idebenone and/or neurotrophic factors, preferably insulin-like growth factor I (IGF-I).

23. Use according to any one of claims 10 to 22 in combination with selenium.

24. Use of cells with reduced frataxin expression and a reduced cellular glutathione content for identifying and/or validating candidate substances for the treatment of Friedreich Ataxia (FRDA), preferably cells with a reduced cellular glutathione content derived or isolated from Friedreich Ataxia (FRDA)-patients.

25. Use according to claim 24, characterized in that an inhibitor of the γ-glutamyl cysteine synthetase, preferably BSO (L-buthionine-(S,R)-sulfoximine), is added to said cells and said cells are cultured in selenium-restricted medium.

26. A method of preparing a compound useful in the treatment of Friedreich Ataxia comprising the steps of any of claims 1 to 8 and isolating and/or synthesizing the compound positively tested.